Changes in quality of life shortly after routine cataract surgery assessed using a non-procedure specific patient-reported outcome measure

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Abstract

Objective

A pilot study to explore use of a generic patient-reported outcome measure to assess patient-perceived improvements in quality of life within 2-4 weeks of routine cataract surgery, and to explore differences after first or second eye surgery. Secondary analysis explored effects of gender and ethnicity.

Design

Prospective observational study.

Participants

Consecutive patients attending a weekly nurse-led postoperative clinic.

Methods

The Glasgow Benefit Inventory (GBI), a validated, post-interventional questionnaire (not specific to one particular medical or surgical intervention), was administered. Mean scores were calculated. Scores were compared when patients were grouped by first or second eye, and by gender or ethnicity (unpaired *t* test). Scores potentially range from +100 (maximum benefit) to -100 (maximum detriment).

Results

The GBI was administered 113 times to 109 patients (4 patients were seen following both first and second eye surgery). Mean overall score was +22.8 (median +19.4; SD 19.7; 95% CI +19.2 to +26.4). Mean (SD) sub-scores were +30.5 (25.3), +17.8 (26.7) and -3.1 (19.9) for general, social support and physical health sub-domains respectively. Total benefit scores were not significantly different for first or second eye surgery, or across gender ($p>0.3$). Scores for patients of African (including African Caribbean) ethnicity were significantly higher than those obtained from European patients ($p=0.002$).

Conclusions

Patients reported significant improvements in quality of life even a few weeks after cataract surgery, as assessed by the GBI. Second eye surgery appeared to confer similar benefit to first eye surgery. The significant difference in scores between ethnic groups invites further investigation.

Introduction

Cataract surgery outcomes are commonly assessed in terms of post-operative visual acuity and refractive error. The importance of patient-perceived improvements in quality of life should not be overlooked, and neglecting these can under-estimate overall benefit.[1] A number of quality of life questionnaires have been used in the context of cataract surgery; improvements in vision-specific functioning are clear, although effects on generic health are less established.[2,3]

The Glasgow Benefit Inventory (GBI) is a validated post-interventional questionnaire originally developed to assess changes in quality of life after otorhinolaryngological procedures.[4] The GBI is not procedure specific, thus having the advantage of enabling comparison across different interventions even in different specialties, which can be valuable in terms of health resource planning. It also has the advantage of ease of use in that it is administered only once (other instruments require administration before and after the intervention). It has been used in over 100 studies of different otorhinolaryngological interventions, and also more recently in a number of studies of oculoplastic procedures.[5-9] The instrument has not been used in cataract surgery, but such data would be useful to allow comparison with other procedures. This pilot study aimed to assess whether the GBI would be sensitive enough to pick up changes in quality of life as early as a few weeks following routine cataract surgery.

Other issues of concern in health resource planning include the relative benefits of first and second eye cataract surgery. Whilst the benefits of first eye surgery are undisputed, the necessity of operating on the second eye is not always clear, though studies have shown that this is of benefit.[10] We aimed to also assess whether GBI

scores differed between patients who had undergone surgery to their first or second eye. If second eye cataract surgery were to confer less benefit, this might be reflected in a lower GBI score.

Issues of equal access to healthcare across gender and ethnicity are also important. We also aimed as a secondary outcome to explore whether differences in scores were seen when patients were grouped by gender or ethnicity. Any differences apparent would warrant further investigations into potential causes and whether they may reflect barriers to access or use of healthcare in certain groups.

Methods

Setting and inclusion criteria

Consecutive patients attending a weekly, nurse-led, post-operative cataract clinic in a large ophthalmology department in London, over a four month period were included. Patients undergoing uncomplicated cataract surgery are followed up in this clinic typically 2-4 weeks post-surgery. Patients attending for their first post-operative visit were included.

The GBI was administered as an interview by nursing staff and technicians in clinic. Additional information on age, gender, and ethnicity was recorded, and whether this was the patient's first or second eye to undergo cataract surgery.

The Glasgow Benefit Inventory (GBI)

The GBI consists of 18 questions relating to changes in quality of life, each answered on a five point Likert scale.[4] It yields an overall score and three sub-scores. The "general" sub-score is obtained from 12 questions assessing general changes in quality of life (including psychosocial health), such as "Have the results of your surgery made your overall life better or worse?". Two further sub-scores (each comprising three questions) relate to social support (with questions such as, "Since your surgery, do you feel that you have more or less support from your friends?") or general physical health (with questions such as, "Have you been to your family doctor, for any reason, more or less often, since your surgery?). The questionnaire can be self-completed by patients or administered in the form of an interview, with the latter method felt to yield more complete and comparable results (as advised by the Medical Research Council UK

Institute of Hearing website https://www.ihr.mrc.ac.uk/projects/gbi - accessed 27 Dec 2015; the questionnaire can also be downloaded from this webiste). Scores range from +100 (maximum benefit) to -100 (maximum detriment); a score of zero indicates no change.

Main outcome measures

Primary outcomes were mean GBI scores for the group as a whole, and comparison of mean total scores between patients undergoing first and second eye surgery (two-tailed unpaired t test). In addition, mean scores were compared for males and females and across ethnic groups. Potential correlations with age and time since surgery were quantified with Pearson's correlation coefficient.

Multivariate linear regression was also performed, to explore which variables might be associated significantly with total score, following adjustment for potential confounding by covariables.

Ethical approval

The study was registered with the Guy's & St Thomas' NHS Trust Audit Department and did not require formal ethical approval (as confirmed by Guys & St Thomas' NHS Trust Research & Development Department).

Results

The GBI was administered 113 times to 109 patients (4 patients were seen following both first and second eye surgery during the time period of the study). Mean patient age (SD) was 70 (11) years (median 71, range 35-96). Fifty-eight patients were female (53%). Median number of days since surgery was 17 days (mean 15, SD 4.1, range 10-28 days). Ethnicity was recorded for 104 patients (95%): 68 patients were of European descent; 33 were of African ethnicity (including African Caribbean), and 3 patients were of Asian origin.

Six questionnaires (5%) had some missing data: of these, three had only one item missing, one had two items missing, and two had three items missing. As these questionnaires were still substantially complete, they were included in the analysis with the missing items taken as “no change” responses. (A separate analysis was performed, excluding these six questionnaires, and their exclusion was found to have no effect on the findings, in terms of which variables were significantly different between groups.)

Overall scores

Mean overall benefit score was +22.8 (median +19.4; SD 19.7; 95% CI +19.2 to +26.4). Mean sub-scores were +30.5 (SD 25.3; 95% CI +25.8 to +35.2), +17.8 (SD 26.7; 95% CI +12.9 to +22.7) and -3.1 (19.9; 95% CI -6.8 to +0.6) for general, social support and physical health sub-domains respectively. In most cases a negative physical health score was simply due to having to use eye drops post-operatively (which scores as “extra medication” in this domain).

Comparison between first and eye and second eye surgery

Sixty-eight patients were surveyed following first eye cataract surgery, and 45 following second eye surgery. Mean age and number of days since surgery did not differ between the two groups (p = 0.96 and 0.83 respectively). Mean overall scores were +22.0 (SD 17.4, 95% CI +17.9 to +26.2) and +24.4 (SD 22.9, 95% CI +17.7 to +31.1) following first and second eye surgery respectively (p value for difference between groups 0.56). There were no significant differences between the two groups for any of the scores or sub-scores (p > 0.35 for all comparisons). Table 1 compares baseline characteristics, and Table 2 shows mean and median scores for the two groups.

Effect of age and time since surgery

Potential correlations of scores with age or with time since surgery were explored. No strong correlations were seen (all values of the correlation coefficient were below 0.17). All patients were seen within four weeks of surgery.

Comparison between genders

Comparisons were also made by gender. Interestingly males were significantly younger than females (p =0.03, unpaired t test). Mean (SD) ages were 68 (11) and 72 (11) years for male and female patients respectively. Other baseline characteristics were similar.

Mean (SD) overall scores were +24.5 (21.3) for males, and +21.0 (18.6) for females (*p* value for difference between groups = 0.38). There were no significant differences between the two groups for any of the scores or sub-scores ($p > 0.15$ for all comparisons).

Comparison between ethnicities

Comparisons were also made between ethnic groups (Asian patients were excluded as there were only 3 patients in this group). Table 3 shows baseline characteristics by ethnicity. None of the comparisons for baseline characteristics were statistically significant.

Mean (SD) overall scores were +30.8 (17.8) and +18.2 (20.3) for African and European ethnicity patients respectively (*p* value for difference between groups 0.002). There were also significant differences between the two groups for general sub-scores ($p = 0.004$) and social support sub-scores ($p = 0.03$), but not for the physical health sub-score ($p = 0.32$). Table 4 shows the scores and sub-scores.

Figure 1 compares mean scores graphically for the different groups (left panels) and also shows the density distributions for total scores for the groups (right panels). The distributions in the right panels show that the overwhelming majority of patients in all groups had positive total scores, indicating overall benefit.

Results of multivariate regression

The following variables were incorporated into a multivariate linear regression: age, gender, ethnicity, time since surgery and whether first or second eye. Patients with unrecorded ethnicity (5 patients) were excluded, as were the 3 patients with Asian ethnicity (as there were so few patients in this group). Of all the variables, only ethnicity was found to be associated significantly with total score (p=0.004). P values for age, gender, time since surgery and whether first or second eye were 0.14, 0.93, 0.43 and 0.60 respectively.

Comparison with published GBI scores following oculoplastic procedures

The GBI was used recently to explore outcomes following a number of oculoplastic procedures.[6] In that study, mean total scores ranged from +18 to +32. The ranges were +22 to +39, +2 to +25, and –8 to +17 for general, social support and physical health sub-scores respectively. The scores and sub-scores of the present study appear to be comparable.

Discussion

In this pilot study, we used the Glasgow Benefit Inventory to assess patient-perceived quality-of-life changes following routine cataract surgery, and also explored potential differences between first and second eye patients and across gender and ethnic groups. Our findings confirmed that patients had positive changes in quality of life following cataract surgery as assessed with the GBI, administered only a few weeks post-surgery (mean score +22.8, 95% CI +19.2 to +26.4). Also, statistically significant improvements in quality of life were noted after both first and second eye surgery. No

significant differences in scores were seen when comparing first eye or second eye surgery or when comparing males and females. Interestingly, patients of African (including African Caribbean) ethnicity gave higher mean scores than patients of European descent. Mean scores were also in the same range as that found in a recent study of four oculoplastic procedures.

Numerous quality-of-life instruments and patient-reported outcome measures exist, and convincing arguments have been made for the use of more complex, third-generation instruments involving item banking and computer adaptive testing.[3] The GBI is relatively simple, but has a number of advantages: it was developed to be patient-centred and specifically sensitive to change since an intervention;[4] its use has been validated in a range of procedures already; it is not procedure specific, thereby allowing comparison across different interventions; it is also remarkably easy and rapid to administer, needing only to be administered once, and involving only 18 question each with only 5 possible responses. The clinic staff found it easy to use, with patients happy to complete the survey. Rating scales with five or fewer, labelled response categories function more effectively than those with a greater number.[11] Future studies could explore correlations between the GBI and other instruments, such as the 25-item National Eye Institute Visual Function Questionnaire (NEI VFQ-25).[12]

The finding of improvements in quality of life after second eye cataract surgery is relevant, and adds to the literature showing that this confers benefit. In fact, no significant difference in benefit was found between first eye and second eye patients, suggesting that the perceived improvement in quality of life after second eye cataract surgery is not less than that conferred by first eye cataract surgery. Thus surgery in the

second eye may be as important and meaningful to patients as surgery in the first eye, supporting the notion that second eye surgery should not be unnecessarily delayed or regarded as unimportant. Whether the study had sufficient power to detect a clinically important difference between the two groups is relevant. Taking into account the spread of our data, we calculated that our sample size would have 80% power to detect a mean difference in scores of 10.7 between the two groups (with a significance level of 0.05). This corresponds to only 2 (or fewer) out of the 18 questions answered consistently differently by only one point on the Likert scale. A difference less than this might be unlikely to be regarded as clinically important, suggesting our study had adequate power.

One limitation of the study is that patients often underwent second eye surgery within months of the first eye (indeed four patients were seen after both operations within the duration of the study), and so reported perceptions of improved quality of life may have related to both operations rather than just the second. Staff were instructed to specifically ask patients to respond in relation to their most recent operation. Also, ocular co-morbidities and visual acuity data (including acuity in the other eye) were not reliably recorded with the survey responses, so comparisons between different groups based on co-morbidities and pre- or post-operative visual acuity were not performed. A further limitation was questionnaire administration by multiple members of staff; some degree of inter-operator variability would be likely.

Our finding of differences between mean scores by ethnicity is intriguing. It is possible that African (and African Caribbean) patients present pre-operatively with more advanced cataracts, with lower visual acuity (which may be due to differences in

access to healthcare or susceptibility) and therefore report greater benefit after surgery. It is also possible that language differences could affect understanding of questions or different cultural attitudes towards medical staff may influence the likelihood of positive or negative responses. Previous studies have demonstrated differing prevalence of eye disease, including cataract, across ethnic groups,[13-15] and have also shown differences in rates of treatment, which is influenced by access to healthcare.[15] A recent study of Medicare recipients found a 30% lower rate of cataract surgery amongst blacks compared to whites, after adjustment for age and sex.[16] The United Kingdom has a different healthcare system from the United States, but some inequalities in access to health are likely to exist. The findings of the present study warrant further exploration. A simple division by ethnic group might be too simplistic, given likely differences within each ethnic group: in the diverse population of London, it is not valid to assume that all patients classed as European speak English as a first language or have always lived in the UK; conversely, many patients from ethnic minorities may speak English as a first language. Future studies could incorporate more complex analysis, and consider indices of socio-economic deprivation, together with presenting visual acuity. The lack of additional data, especially visual acuity, in the present study limits our ability to explain the difference by ethnicity beyond mere speculation.

Our study has provided useful baseline data, enabling future comparisons with patient-perceived outcomes after other interventions or in different cataract groups. The study included only patients seen in a particular nurse-led post-operative clinic, designed to see patients following uncomplicated cataract surgery (though post-operative complications are sometimes identified in this clinic, and patients frequently had a range of ocular co-morbidities). Patients who experienced intra-operative complications or who, for other reasons might be followed up in specialist clinics (for example for

close follow-up of a particular co-morbidity) would have been excluded. Hence our results are potentially generalisable only to patients having surgery without significant intra-operative complications. Also, we looked specifically at changes in quality of life assessed at the first post-operative visit (within 2-4 weeks following surgery). Such an early time point may affect some scores: for example, patients are frequently still using post-operative eye drops, which would generate a negative physical health sub-score as this counts as an extra medication. Future studies could investigate later time points to see whether the perceived change in quality of life shows stability over time.

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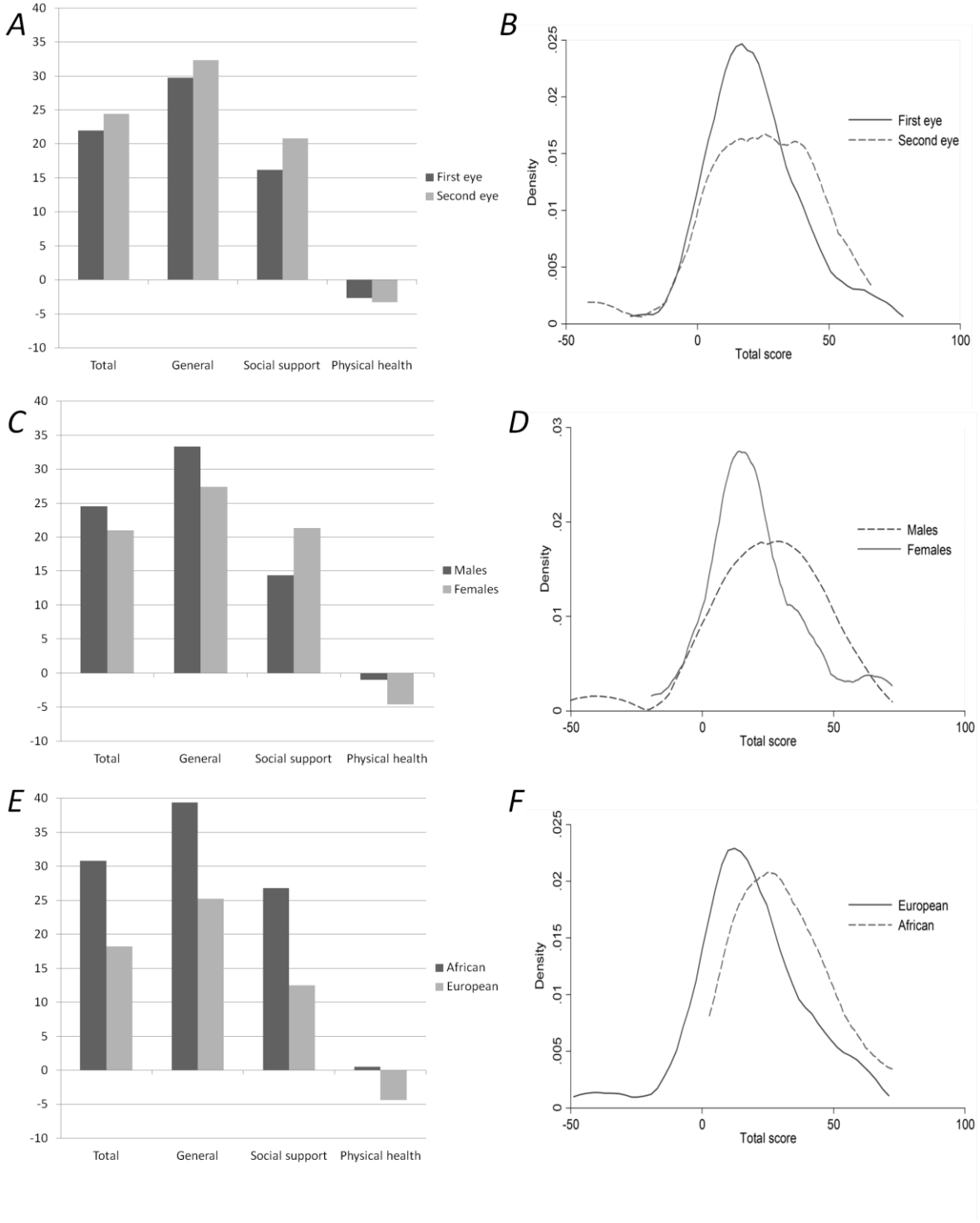
Figure legends

Figure 1. Mean scores and sub-scores (left panels *A,C,E*) and distributions of total scores (right panels, *B,D,F*) for first eye and second eye groups (*A,B*), males and females (*C,D*), and different ethnic groups (*E,F*). For the right-hand panels, the x-axis plots total scores, and the y-axis is the density function. Inter-group differences in scores were statistically significant only for the ethnicity comparison (total score, and general and social support sub-scores).


A
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35
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European
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Tables

Table 1. Baseline characteristics of patients surveyed after first or second eye surgery.

	First eye	Second eye	*p* value for difference
Number of patients	68	45	
Age (years)			
Mean (SD)	70 (11)	70 (11)	0.96
Median (range)	70 (42-96)	71 (35-94)	
Time since surgery (days)			
Mean (SD)	15 (3.8)	16 (4.6)	0.83
Median (range)	17 (10-24)	14 (10-28)	
Gender			
% female	50%	60%	0.30
Ethnicity			
% European	68%	62%	0.52

Table 2. Comparison of scores for first eye and second eye patients.

	First eye	Second eye	*p* value for difference
Total score			
Mean (SD)	+22.0 (17.4)	+24.4 (22.9)	0.56
Median	+19.4	+27.8	
Range	-19.4 to +72.2	-41.7 to +66.7	
General score			
Mean (SD)	+29.7 (23.1)	+32.3 (28.7)	0.61
Median	+29.2	+37.5	
Range	-29.2 to +91.7	-58.3 to +83.3	
Social support			
Mean (SD)	+16.2 (26.9)	+20.8 (26.7)	0.37
Median	+16.7	0	
Range	-66.7 to +100	0 to +83.3	
Physical health			
Mean (SD)	-2.7 (20.3)	-3.3 (22.9)	0.78
Median	0	0	
Range	-33.3 to +100	-50 to +66.7	

Table 3. Baseline characteristics of African and European ethnicity patients.

	African	European	*p* value for difference
Number of patients	33	67	
Age (years)			
Mean (SD)	68 (11)	71 (12)	0.23
Median (range)	69 (42-86)	71 (35-96)	
Time since surgery (days)			
Mean (SD)	14 (3.9)	16 (4.0)	0.06
Median (range)	14 (10-22)	17 (10-28)	
First or second eye			
%first eye	61%	66%	0.62
Gender			
%female	45%	57%	0.26

Table 4. Comparison of scores for patients by ethnic origin.

	African	European	*p* value for difference
Total score			
Mean (SD)	+30.8 (17.8)	+18.2 (20.3)	0.002
Median	+27.8	+16.7	
Range	+2.8 to +72.2	-41.7 to +63.9	
General score			
Mean (SD)	+39.4 (20.2)	+25.2 (27.5)	0.004
Median	+37.5	+20.8	
Range	+4.2 to +91.7	-58.3 to +87.5	
Social support			
Mean (SD)	+26.8 (32.5)	+12.5 (22.6)	0.03
Median	+16.7	0	
Range	0 to +100	--66.7 to +66.7	
Physical health			
Mean (SD)	+0.5 (24.8)	-4.4 (18.4)	0.32
Median	0	0	
Range	-33.3 to +83.3	-50 to +100	